National Institute of Environmental Health Sciences

Drinking water systems, hydrology, and childhood gastrointestinal illness in Central and Northern Wisconsin

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Abstract:

OBJECTIVES: This study investigated if the type of drinking water source (treated municipal, untreated municipal, and private well water) modifies the effect of hydrology on childhood (aged < 5 years) gastrointestinal illness. METHODS: We conducted a time series study to assess the relationship between hydrologic and weather conditions with childhood gastrointestinal illness from 1991 to 2010. The Central and Northern Wisconsin study area includes households using all 3 types of drinking water systems. Separate time series models were created for each system and half-year period (winter/spring, summer/fall). RESULTS: More precipitation (summer/fall) systematically increased childhood gastrointestinal illness in municipalities accessing untreated water. The relative risk of contracting gastrointestinal illness was 1.4 in weeks with 3 centimeters of precipitation and 2.4 in very wet weeks with 12 centimeters of precipitation. By contrast, gastrointestinal illness in private well and treated municipal areas was not influenced by hydrologic conditions, although warmer winter temperatures slightly increased incidence. CONCLUSIONS: Our study suggests that improved drinking water protection, treatment, and delivery infrastructure may improve public health by specifically identifying municipal water systems lacking water treatment that may transmit waterborne disease.

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Resource Description

Early Warning System: ☒

resource focus on systems used to warn populations of high temperatures, extreme weather, or other elements of climate change to prevent harm to health

A focus of content

Exposure : ☒

weather or climate related pathway by which climate change affects health

Food/Water Quality, Precipitation

Food/Water Quality: Pathogen

Geographic Feature: ☒

resource focuses on specific type of geography

Rural

Geographic Location: ☑

resource focuses on specific location

United States

Health Impact: ☑

specification of health effect or disease related to climate change exposure

Infectious Disease

Infectious Disease: Foodborne/Waterborne Disease

Foodborne/Waterborne Disease: General Foodborne/Waterborne Disease

Mitigation/Adaptation: ☑

mitigation or adaptation strategy is a focus of resource

Adaptation

Population of Concern: A focus of content

Population of Concern: ☑

populations at particular risk or vulnerability to climate change impacts

Children, Elderly, Low Socioeconomic Status, Pregnant Women

Other Vulnerable Population: Immunocompromised

Resource Type: ☑

format or standard characteristic of resource

Research Article

Timescale: ☑

time period studied

Time Scale Unspecified

Vulnerability/Impact Assessment: ☑

resource focus on process of identifying, quantifying, and prioritizing vulnerabilities in a system

A focus of content